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## Moody Furballs And The Developers Who Love Them

**It smiles.  
It sneezes.  
It sings.  
It never shuts up.  
It's the toy that will make you forgive Barney.**

*By Scott Kirsner*

Alan Hassenfeld was in the showroom. And Furby was dead.

The chair of Hasbro, the world's second-largest toy company, had arrived at Tiger Electronics's New York showroom on the 13th floor of the Toy Building, 200 Fifth Avenue. It was Friday, February 6, 1998. Hasbro had been searching for a tech-savvy acquisition to give it an edge over arch rival Mattel. Hassenfeld believed Tiger, a specialist in electronic gadgetry and, with its Giga Pets line, a big player in last year's virtual-pets fad, was that company. Three days later, he planned to announce Hasbro's US\$335 million purchase of Tiger.

But three rooms away, Tiger's top product developers and engineers were scrambling to resuscitate their secret weapon: Furby. The toy worked fine in Tiger's backstage workshop, yet when the rotund little creature was brought into the showroom and switched on - nothing. An animatronic "plush" animal that children could nurture and teach and play with, Furby was intended to be a sort of Giga Pets 2.0 - Tiger's follow-up to last December's top-grossing toy. But the 5-inch hairball with the gremlin ears and saucer eyes was lying motionless on its display table.

Hassenfeld, accompanied by Tiger's proud cofounders, began winding his way through the circuitous showroom, surveying his new domain. It was about this time that Jeff Jones, Tiger's vice president of marketing, began to sweat. He'd devoted the past three months of his life to bringing Furby this far. He looked up at the hot halogen lights in the showroom and asked his engineers if maybe the temperature was too high for Furby. Jones was close. The lights were creating an electromagnetic field that was interfering with the signals traveling along a wire between Furby and a concealed black emulator box, which contained all of the toy's electronic guts. Frantically, Jones and his colleagues took some tin foil and wrapped it around the cord, to shield it from the radiation.

Hassenfeld stopped in front of Furby. "This is your bonus for buying Tiger," proclaimed Tiger chair and cofounder Randy Rissman. With no idea whether Furby would work, Jones flipped the switch. Furby performed on cue, opening its eyes and chattering with delight for the Hasbro chair. Though this prototype contained just 5 percent of the functionality that the final toy would have, Hassenfeld told Tiger's cofounders that Furby was the coolest thing he'd seen in his 25 years in the business.

The next week, Furby would debut at the 95th American International Toy Fair; if all went according to plan, it would be the big toy for Christmas. Yet by all rights, the toy shouldn't have gotten this far: Tiger had rushed it into development only three months earlier, astonishingly late by industry norms. But Tiger was desperate for a hit. It needed an encore to Giga Pets. And Hasbro, which had

watched Microsoft enter the toy business with its Interactive Barney doll and stood by as Mattel formed a joint venture with Intel, was anxious to stake out its position as a purveyor of technologically sophisticated playthings.

They both needed Furby.

American toy companies have long been skittish about technology. In the 1980s, the videogame business bankrupted Coleco, the maker of Cabbage Patch Kids and ColecoVision, and nearly brought Mattel to its knees. Early in the 1990s, Hasbro funneled a reported \$45 million into a virtual reality project before abandoning it. Hasbro execs understood how to manufacture and market action figures like G.I. Joe, but when it came to chips and code, they were clueless.

Which was a problem. The recent success of toys containing microprocessors, from Tickle Me Elmo to Tamagotchi to Barney, has buttressed the belief that technology will be the industry's savior. While earlier generations of high tech toys were clunky and unresponsive to a child's input, the newer ones insinuate themselves into their owner's life in sometimes alarming ways. Some schools banned virtual pets because children were more focused on "feeding" them than on paying attention to the teacher, and many parents fretted when their offspring began mourning digital creatures that had croaked. Toys like Furby, which exhibit rudimentary artificial intelligence, integrate themselves even more tightly with a child's life - speaking a secret language, playing games, seeking praise. The technology is increasingly invisible; no instruction manual is necessary, and children can have what they most desire: the perfect friend, loyal and unconditionally loving.

The industry is betting that this technological-psychological alchemy will yield some hits. Without them, the industry slumps; when Toys "R" Us announced earlier this year that its first-quarter earnings had dropped 35 percent, it blamed the plunge in part on the absence of a hit toy to bring in shoppers. What makes this dependence on hits and fourth-quarter sales even scarier is that hits can come from any corner of the industry. Witness the Beanie Babies craze, which was perpetrated by Ty Inc., a little-known, privately held Illinois company. The giants of the industry - Mattel and Hasbro - have been scooping up the independents in the hope that consolidation will increase their odds of bringing a few hits to market every year.

Such was Hasbro's thinking when it acquired Tiger Electronics. Based in a nondescript one-story office park north of Chicago, Tiger, according to its new parent's first-quarter report, would help provide Hasbro with "a platform for future earnings growth." Industry watchers agreed. *The Providence Journal-Bulletin*, based in Hasbro's home state of Rhode Island, said the Tiger purchase "catapults Hasbro ... into the high tech big leagues." Sean McGowan, a toy industry analyst at the research firm Gerard Klauer Mattison & Co., projected that Tiger would account for 10 percent of Hasbro's 1998 sales.

Founded in 1978 by Randy Rissman and Roger Shiffman, the company originally made low tech items like Mickey Mouse phonographs, but it eventually began to branch out into handheld electronic games and learning aids. The company's first breakout hit, tied to the release of *Home Alone*, was the Talkboy, a voice digitizer used onscreen by Macaulay Culkin. Last year, Tiger saw the virtual pets craze coming and offered up its line of Giga Pets to compete with Tamagotchi, marketed by Japan's Bandai.

"They're risk takers," says Gary Carlin, the president of Inventor's Greenhouse, a Boston company that works with toy inventors to bring ideas to market.

"We're not afraid," boasts Marc Rosenberg, Tiger's vice president for public relations, "to swing for the fences."

That's what Roger Shiffman intended to do when he was first introduced to Furby by its inventor last

September. Tiger, like most toy companies, develops some toy ideas in-house and buys others from outside inventors. Furby was developed by one such freelancer, a man to whom Tiger introduced me only after I agreed not to name him. The company seemed concerned that if the inventor, whom I'll call Eric, gets too much publicity, he may increase the royalty fee he demands from Tiger on future projects.

Eric works out of his home, in a national forest between Reno, Nevada, and Sacramento, California. A former Mattel designer who helped code Atari videogames in the '80s, Eric had attended the 1997 Toy Fair in New York and seen the numerous iterations of virtual pets. "I'd always wanted to make a little animated character that was as alive as possible," he says, Furbies clucking in the background. "The success of virtual pets gave me permission to say, 'What's the next step?'" A skilled hardware and software engineer, Eric spent the next several months - and his own money - developing a prototype Furby.

By late summer, when Eric was ready to shop the prototype around, he consulted with Richard Levy, a fellow toy inventor, about which companies would be most receptive to the concept. Levy introduced Eric to Tiger. "If they like it, they'll be able to do it quickly," Levy told him.

In a Los Angeles hotel room, Shiffman saw a version of Furby that was manually controlled with dials and brought to life like a puppet. This Furby uttered not a chirp from its yellow beak. According to Eric, though, the finished Furby would be able to play games, communicate with other Furbies via infrared signals, learn English by means of positive reinforcement, and teach a child Furbish (a Furby's native tongue).

No two Furbies would share the same personality or react to stimuli in the same way. They were Cabbage Patch dolls with artificial intelligence, Tickle-Me Elmos that could influence each other. One Furby, for example, would be able to make another Furby sneeze, or spark a giggle fit among its friends. Shiffman was enchanted. Furby was, he thought, "a living Giga Pet you can really play with." Unlike Giga Pets, though, Furby wouldn't die. If you ignored Furby for a few days, it would simply get ornery. "I instantly felt there was an opportunity for us," he recalls.

So much of an opportunity that Shiffman wanted to bring it out immediately - by Christmas 1998, not in '99 or 2000, the way other companies would. "There's a huge risk factor when you're trying to do a breakthrough in a short time frame," says Shiffman, a big man with shoulder length, light-brown curls and sideburns that meander down toward his jaw. Two little wrinkles at the corners of his mouth curl up into a smile. "But this was too exciting not to try."

When Shiffman brought Furby to a meeting of Tiger's product development and marketing team in October 1997, not everyone was so bullish. Some worried the toy might steal focus and resources from the rest of Tiger's line. Others were sure Furby was vaporware. Marketing VP Jones was among the skeptics. He saw Furby as "an overpromise, underdeliver type of thing" - the brainchild of an inventor who simply wanted financing from Tiger to help him figure out the technology.

"There was a real schism," recalls Stewart Sims, a balding, buttoned-down senior vice president of marketing at Tiger. "Some of us absolutely loved it, and some felt it was outside our normal area of success. We'd never done a plush before."

"A few people said it's kind of young, it's kind of girly," says Rosenberg, a hyperactive permateen with a moussed pompadour of black hair, who carries a pair of drumsticks around the office (but doesn't actually play drums). "But we said, fuck it, we can fix that."

Three things inspired Tiger to swing for the fences with Furby. First, since Furbies communicated with each other and would come in many different styles, Tiger believed that children would be inspired to buy more than one. Commercials could even prod kids into collecting entire colonies, just as they had with Ty's Beanie Babies.

Second, Tiger felt it could produce Furby cheaply enough, in China, to sell the finished toy in the US for \$30 or less. That would dramatically undercut Microsoft's Barney, which costs \$110 (plus about another \$100 for accessories) and also requires a personal computer. While Barney, on which Eric had been a consultant, wowed the industry last year with its ability to move and speak in coordination with educational PC software and television broadcasts, its price tag and add-on components have kept Microsoft from moving high volumes of the toy.

Third, Tiger thought Furby had the potential to grow into an enduring brand. The toy business, perpetually at the mercy of fashion trends and playground fads, is always searching for brands that can transcend the here and now. A Barbie - which is still the industry's dominant brand after nearly 40 years and accounts for 40 percent of Mattel's total sales - can act as a pure profit engine for a toymaker; its brand equity and strong name recognition help guarantee distribution, and its high margins help Mattel cover the development costs of a lot of failures. "The goal," explains Tiger executive Sims, "is to take an initial hit and sustain it over time, but keep it fresh for consumers." Tiger could enhance Furby's technology each year and develop new characters, turning a one-time hit into a perennially popular brand.

Furby could be the *Australopithecus afarensis* of an entire race of artificially intelligent toys. Its category - "special feature plush" in toy-biz lingo - had already shown its potential, having grown 223 percent in 1997 over the year before. With other special feature plushes, like Microsoft's Barney and Mattel's interactive Winnie the Pooh, already coming to market in a big way, the category looked like the hot one for the next holiday season - a train Tiger could not afford to miss. So what if Furby was a departure for the company? By November 23 the contracts had been signed and Tiger was committed to do everything it could to bring Furby to market for Christmas 1998.

Not many toys get the green light at Tiger. Of every 200 that are presented to the company's inventor relations rep, only about 10 make it to the executive committee. Of those, Tiger proceeds with just two. And as the development process continues, one usually gets dropped, generally because the technology won't work properly or the product can't be produced cheaply enough to turn a profit. The remaining toy is then launched into battle against similar products on the shelves of the local Toys "R" Us, where about 40 percent of new toys will flop. It's not unusual for toy companies to contribute "markdown money" so that retailers can heavily discount toys that don't capture children's fancy. Those long odds have been a major factor in the consolidation of the industry; companies that couldn't continually roll out hits went under, and many that had the touch have been bought up by Hasbro and Mattel, which can take advantage of economies of scale to reduce development, distribution, and marketing costs.

The team at Tiger seems to thrive on beating the odds - they're gamblers at heart. In November 1997, Jones, the marketing VP and a veteran of Hasbro's G.I. Joe team, and Sims, who oversees product development at Tiger and who had headed international marketing for Tonka Toys before Hasbro acquired it, volunteered to lead the Furby charge. Their objective: make sure that Furby would show up on shelves by the following August. That would let Tiger sell Furby throughout the fourth quarter.

Jones and Sims decided that Furby was on too rapid a development track to enlist Tiger's own team of Hong Kong-based engineers; they were busy with other products, and the geographical and time difference would hamper progress. So they engaged Eric to design Furby's electronic brain, and they hired an outside group to engineer its mechanics. Jones won't name the company because of competitive concerns. (The toy business is so secretive and fearful of copycats that at Toy Fair, I was thrown out of one showroom for asking about a company's innovations in radio-controlled vehicles, and refused admittance to several others because I didn't have a personal invitation.)

Furby, according to the spec, was to be capable of at least 300 different unique combinations of eye, ear, and mouth movements, all generated by a set of cams driven by a single 8,000-rpm motor and controlled by two microprocessors. The toy would have attitude sensors that could tell whether it was standing or being held upside down. Light sensors would tell it when to go to sleep, a

microphone would enable it to respond to sound, and pressure sensors would let it know when it was being petted. An infrared transceiver between Furby's eyes would let it interact with other members of its species.

Jones and Sims, working in coordination with Eric, had to figure out how to deploy these capabilities to create a compelling facsimile of life. Moreover, Furby's fathers wanted to mix it up: Instead of drafting a simple if/then table for inputs and outputs (for example, "If light is turned on, then open eyes and yawn"), they wanted Furby to react unpredictably to stimuli. When awakened, Furby might cry or act startled; if one Furby was angry, another Furby in the same room might start singing to soothe it.

Coordinating the mechanical and electronic development of Furby and refining the toy's outward appearance began to consume Jones's and Sims's days. Jones estimates he spent more than half of his time on Furby and the remainder on the rest of Tiger's line. The task they faced was complex - the more so given the foreshortened schedule. While Furby wouldn't come to market until August, they had to create a working prototype for Toy Fair, the industry's biggest conclave, less than three months away.

Sims started to refine Furby's vocabulary. "When you first open the box, we wanted Furby to tell you its name in Furbish," he explains. With his level demeanor, Sims is the only exec at Tiger who could plausibly fit into a conventional corporate environment, which makes it seem all the more bizarre when he starts speaking Furbish. "'Me Nooloo' would mean 'I'm happy.' Gradually, Furby will learn to integrate English into its vocabulary, much like an immigrant to the United States. Kids will get an English-Furbish dictionary, and we think they'll learn to speak Furbish."

It began to feel as though the Tiger executives were not only genetically engineering a new creature, but crafting a new culture from scratch. Everyone began to suggest new Furbish words, or ways that Furby would react to the world. Even though the toy was targeted primarily to girls, Jones and a colleague, former Acclaim videogame designer Simon Gouldstone, wanted Furby to have some traits that would appeal to boys. So they introduced belching and farting into the toy's database of actions.

While Sims, Jones, Eric, and the engineering teams were honing Furby, Tiger's ad agency was honing Furby's message. Posnick & Kolker of New York (whose founders helped Coleco launch Cabbage Patch Kids in the 1980s) had been brought in even before Tiger had committed to going ahead with Furby. Its tasks, too, were formidable. Furby's core market was to be girls between the ages of 4 and 11 - a demographic that, until last year's virtual pets craze, conventional wisdom said would forever shun tech-oriented toys. And Tiger wanted to appeal to a broader market as well, the way Giga Pets did.

"This was a toy with a lot of marketing challenges," says Stephen Kolker, the agency's president, who has worked with Tiger since 1991. "It has to be new and amazing and futuristic, and at the same time it has to be soft and cuddly. You can't push it as a technological marvel, because what kids want is a toy they can play with. It needs an identity. We have to get kids to understand that every Furby is one-of-a-kind, speaks its own language, and knows its own name. Trying to communicate all the different features of a toy like Furby can get you tied up in knots."

Muffing the pitch could kill Furby at one of two points: first with toy buyers and later with kids. At Toy Fair, every showroom contains a television to screen the ads that will accompany each toy, and buyers tend to devote more time and attention to the ads than to the actual toys in front of them. "On a lot of toys, especially new introductions, the TV commercial is more important than the toy itself," says Tom Alfonsi, senior vice president of merchandising at K-B Toys, the dominant mall-based toy retailer. Television advertising is so important to a new toy launch that companies typically spend more on media buys than they do developing the toy. Analyst McGowan estimates that Tiger spent as much as \$5 million developing Furby and shooting its prototype commercial but that it will spend at least another \$10 million - 25 percent of the toy's projected first-year sales - introducing it to children on TV.

Tiger was no stranger to television. Before being gobbled up by Hasbro, it was the industry's third-largest television advertiser, behind only its new owner and Mattel. Last year, it spent \$63 million, and this year, with the launch of Furby, Tiger will devote \$70 million to television spots.

In January, with Toy Fair approaching, Posnick & Kolker faced the deadline for shooting the commercial that would introduce Furby to the world's toy buyers. The agency proposed dozens of different ideas to Tiger about how to position Furby, then narrowed these down to four. Among the options: "They're unique because they speak" and "Everything a Furby can do, it learns from you."

"But we asked ourselves, 'What was the one thing that made them distinctive and unique and desirable?'" Kolker recalls. The answer seemed clear: "It was a friend that a child could nurture."

Since no prototypes of Furby existed during the casting period, the agency auditioned a herd of little girls by giving them a cardboard box to hold. "We were telling the child how to react, and what the toy would do," recalls Kolker. "And they were looking at us like, 'This is a box, dummy.'" But when it came to forging an emotional connection between a 7-year-old girl and a cold chunk of plastic with a heart of silicon, Kolker and his partner Paul Posnick were far from neophytes. The 30-second spot they wrote - and filmed over two days in Toronto - wasn't about technology. It was about love and affection, spoken in the familiar language of Saturday-morning acquisitiveness.

Two girls open up a cupboard, revealing a fuzzy little moving ear, a surprised-looking set of eyes. Furby utters some Furbish.

First girl: "What's that?"

Second girl: "It's my Furby."

In a later scene, a girl takes a Furby out of her backpack and plays peek-a-boo with it. The commercial ends with a child in bed with Furby.

Toy to girl: "Me love you."

The tag line, spoken from Furby's point of view, is: "Furby keeps amazing you."

Six weeks of production work on the ad culminated the night before Toy Fair opened, when a digital audiotope containing Furby's voice - the last missing element - was couriered to an editing studio in New York. Jones had already flown down from Toronto, where he had helped supervise the filming, to assist in hammering out the bugs in the prototype. "If somebody presented me with a list of the things we did between November and February and said, 'Do it again,'" Jones says, "I'd look at them like they were crazy."

Toy Fair, in Stewart Sims's words, is "the largest toy store in the world." Hard to argue: With 1,704 exhibitors and 20,000 buyers, the annual show fills New York's cavernous Javits Center and several blocks of showrooms around the Toy Building. The only thing missing among the white-faced mimes, Teletubbies, and out-of-work actors dressed as the Power Rangers, are children.

Toy Fair is usually the middle phase of the toy-buying process. The big retailers, like Wal-Mart and Toys "R" Us, have been offered previews of most products as early as the previous June. They've begun to formulate opinions about which toys will be hits, and which ones will merely suck up shelf space. So Toy Fair, according to Sims, "is an opportunity to come to one location at one time to see all of the toy companies and their products at the final stage of development, see the commercials and the packaging, and confirm their earlier judgments."

How are those judgments made? While the movie *Big* - about a young boy who magically gets to inhabit an adult's body - made a case that successful toy buyers must be superannuated kids,

real-world buyers believe they've internalized the materialistic desires of childhood, and can break them down demographically. "The skills are intangible," says Alfonsi, the buyer from K-B. Unlike huge "big box" stores like Target and K-Mart, most K-B stores, located in malls, are only about 3,000 square feet, and thus the company's buyers must select only merchandise they know will move. "It's in your gut," Alfonsi adds. "You learn through experience - through hits and misses. It's a touchy-feely thing." Because of Furby's fast-track development schedule, no one - not Alfonsi, not even Hassenfeld - had seen it before Toy Fair.

At the fair, Microsoft was introducing two new characters to its ActiMates line - Arthur the aardvark and his sister D.W. were to join Barney. Mattel was hopping on the special-features-plush bandwagon with the \$100 Winnie the Pooh and another interactive, Big Bird. They're cool - Winnie speaks its owner's name and remembers favorite holidays - but they don't seem quite as spontaneously reactive as Furby. They rely on a personal computer and CD-ROMs to give them life. And they're not 30 bucks.

Alfonsi had received a call from Tiger cofounder Shiffman a few weeks before the fair, tipping him off about Furby. "Roger did everything he could to describe it," Alfonsi recalls. "He said it was a hot toy on the cutting edge, taking virtual pets a step further. But he had trouble describing it over the phone." Despite Shiffman's promotional efforts, no one was certain whether Furby would actually be ready for prime time. Indeed, Furby wasn't even Tiger's high-profile lead item in the showroom, because, as Rosenberg puts it, "We didn't know if Furby would show up for Toy Fair." He had a contingency plan, though: He'd simply stretch the Giga Pets area into the space reserved for Furby.

Thanks to the efforts of Jones and his team of engineers, Furby booted up, just in the nick of time. But this was still far from a finished Furby. Whereas version 1.0 was controlled manually by dials, this one, version 1.1, had its guts in a black emulator, connected to the creature by a tether. It demonstrated only about 5 percent of Furby's eventual 300 actions, very little speech or sound, and no infrared capability.

But version 1.1 was impressive just the same. "It blew us away," says Alfonsi. "Tiger created a great little creature, with several different looks. It had a quality that stood out, and we think it'll appeal to a far wider range of kids than Microsoft's Barney. You can see young kids, teenagers, and young adults thinking it's cool." Retailers also loved the \$30 price point. "A toy like Furby will sell well even into the first quarter," Alfonsi says. "You can spend \$30 on a birthday gift, whereas you might not spend \$100." Alfonsi was sold, making what he calls "a significant commitment" then and there.

Other toy buyers made second and third visits to Furby's corner of the Tiger showroom with their bosses in tow. The buyers responsible for electronics toys at several major retailers were fighting with the ones responsible for plush toys. The buyer from Wal-Mart committed, on the spot, to buying a third of Tiger's entire production run. Everyone wanted a piece of Furby's anticipated success.

Tiger was jubilant over Furby's reception. But the company still had to produce the toy in time for Christmas, and once the giddiness wore off, its executives sobered up quickly. Furby's power drain had to be reduced. The electronics in the black box had to be crammed into Furby's small, stubby body. And Tiger had to figure out how to manufacture the thing.

"The Toy Fair reaction was nice," said Jones, back at the home office, "but I don't consider it a success until we ship it."

It is a brilliant May morning in Vernon Hills, Illinois. A receptionist, one of 50 employees who work in the combination warehouse and office space that is Tiger's US headquarters, is coordinating deliveries and shipments between Illinois and Hong Kong, where another 250 employees are stationed. (The New York office and showroom, such a hive of activity around Toy Fair, are virtually empty the rest of the year.)

This is crunch time for Tiger, and Furby's schedule is slipping.

Rosenberg is eager to take a new Furby prototype to the E3 trade show in Atlanta later in the month - Furby version 1.2, at least. Lana Simon, Tiger's perky PR manager, is hoping to get finished Furbies to the parenting magazines for testing, so the toy can get their seal of approval in time for the holidays. "Buyers look to them for a third-party endorsement," explains Simon, whose eyes are almost as big and round as Furby's. "*Parenting*, *Parents*, and *Child* all do big toy issues in November and December, and *CBS This Morning* devotes a few segments to the year's best toys."

But no finished Furbies will be ready for the magazines in time for their testing deadlines. And Jones is concerned that diverting engineers to build a new prototype for E3 will hamper the development of the final product. So Rosenberg is forced to take the same demo version the company had presented at Toy Fair.

Worse, Tiger has gone from talking about shipping Furby in August to aiming for an October 1 release date. Rosenberg knows that's late. "Retailers like to have their Christmas toys on the shelves by September 1," he says, drumming his sticks on a glossy black table. "We're going to be clear that Furby's a late fourth-quarter product, and they'll have to plan for its arrival. We think it's going to be the toy of the year, though, and that doesn't come without punishments."

Indeed, retailers are forced to pay for all Tiger inventory up front. They'll take possession of the product in Hong Kong; shipping will be up to them. To get Furby to their shelves in time for the Christmas rush, most because of the late launch will be forced to fly Furby to the States, since sending product by boat takes six to eight weeks. The air freight will add about \$1 to the price retailers pay for each item. Each dollar retailers pay translates into an additional \$5 to the consumer's price. But retailers would most likely eat some of the increase just to have a hit toy on their shelves in time for the holidays.

After last year's Giga Pets triumph and the positive post-Toy Fair buzz about Furby, Rosenberg is not only not worried about the new schedule's impact on Tiger, he is downright cocky. "Retailers will battle on availability, and they'll be forced to battle on pricing," he predicts. "Some may use it as a loss leader to draw shoppers into the store." So sure is the company of Furby's success that Tiger at one point planned to require retailers to order other, less-hot toys from its 227-page catalog. As Rosenberg put it bluntly: "You can't buy just Furby." (Rosenberg now insists every item, including Furby, can be ordered separately.) The flip side to that cockiness is an ever-present worry. With time so tight, what if something goes wrong? That risk is compounded by Tiger's flat-out, full-steam-ahead plans for manufacturing Furby. Rather than starting production at one factory, ironing out the inevitable snafus, and then slowly bringing other factories online, the company is starting four Asian factories simultaneously. "Coordinating that is turning out to be a bit of a challenge," says Jones. He's as understated as Rosenberg is dramatic.

Since Toy Fair, Furby's ears have gotten smaller, to diminish the similarities between it and the obnoxious Gremlins of cinematic fame. Tiger's execs, after some heavy petting, have picked the fur that Furby will wear. Jones and Sims have been poring over mechanical drawings and circuitry schematics. Mostly, they've been facilitating the interactions between Tiger headquarters, Eric's northern California outpost, and the mechanics consultancies. "We're constantly asking, do we need a model shop? A tooling facility? Another engineer? Do we need to FedEx parts somewhere?" says Jones. "When an engineer reaches for a screwdriver, we want it to be there."

Eric, the inventor, is also ironing out the Furby Communication Protocol - the method by which two Furbies will talk to each other through bursts of infrared light. No one at Tiger has yet seen a demo of this function, and it isn't likely that any outsider will until the first sample Furbies start rolling off the production lines in late summer.

Hasbro, five months into its ownership of Tiger, is also pitching in. Using a CAD and manufacturing system called Pro/E, Hasbro technicians have helped Tiger convert 2-D design drawings to 3-D. This enables Tiger to send a Zip disk of Pro/E schematics directly to its factories. There, the disks will be fed directly into a machine that cuts the tools that make Furby. "Alan Hassenfeld has been committed to Furby from the day he first saw it," Sims explains to me as we eat lunch at a nearby



brewpub with Furby's development team. "That commitment helped reallocate resources to help us. We got the best Pro/E guys on board." Hasbro has also welcomed Tiger into its sophisticated Rhode Island model shop to build more prototypes. In all, Hassenfeld's company has lent about 12 employees to the Furby project, which matched Tiger's number.

Like all good hackers, Jones and company are also trying to push the boundaries a bit. They're building in a set of "Easter eggs" - undocumented features intended to surprise and delight young consumers when they stumble upon them. For instance, when properly prompted, Furby will begin to wriggle in a fit of hysterics. If there are other Furbies within infrared range, they will all join in. "We're hoping some independent Furby Web sites spring up when people begin to find the Easter eggs," says Gouldstone, a Brit with an errant lock of black hair permanently obscuring one eye. "That would be cool." (Not cool enough, however, to stick around until Christmas - Gouldstone left the company this summer.)

Jones and Sims are also trying to fabricate Furby's history - what they call, with a nod to Hollywood, the back story. Furby needs a context to explain where the creature came from, likely to be explained in TV ads and other promotional materials. Earlier, some had suggested positioning Furby as an alien, but that seemed too foreign and frightening for little girls. By May, the thinking was that Furbies live in the clouds - more angelic, less threatening. A freelance writer had been brought in to flesh out the rest of the back story, but no one at Tiger was happy with the results. So Jones and Sims took on the job themselves.

In late May, when a Furby 2.0 Prototype is finally available, Sims immediately takes it west to Los Angeles so that its movements can be puppeteered. Van Snowden, a master puppeteer who has worked with Jim Henson and Children's Television Workshop, will head a team manipulating Furby's eyes, ears, and mouth to create a database of expressions. Later, these will be combined with sounds to impart the illusion of life. "We've already figured out what the stimuli are that *cause* Furby to go to sleep," Jones explains. "Snowden is going to teach Furby *how* to go to sleep."

Assembly language code for Furby's two chips is being tested and finalized and sent to Hong Kong. The mechanical drawings are done, at last. The engineers are still trying to optimize Furby's power consumption, to get at least 20 hours of continuous use from four double-A batteries. Prototype boards are being built, chips masked. By late June, the Pro/E disks have been sent to Asia, the tools have been made, and Tiger's team of Hong Kong engineers is fine-tuning them so that they'll produce perfect Furby pieces.

On the promotional front, Sims is talking with three TV production studios about a Furby cartoon, which, assuming the toy is a hit, will help sustain its popularity. Posnick & Kolker are tinkering with the Toy Fair commercial in anticipation of the launch, and Tiger's media buying agencies are buying time on channels like Fox Kids Network, Nickelodeon, and ABC.

Rosenberg has nailed down a deal for a back-to-school promotional giveaway with Nabisco, which will put Furby's image on the back of 45 million packages of Oreos, Chips Ahoy! and Nutter Butter cookies in August and September. Tiger aims to mark the official launch date - still undetermined - with massive Furby displays at key retailers like F. A. O. Schwarz's flagship store in New York. Closer to Thanksgiving, a contest on the Cartoon Network will give children who learn Furbish the chance to win a toy.

"The idea is to make sure that when the product is ready, the world knows the product is there," explains Rosenberg. Despite his best-laid promotional plans, things can go awry at the last minute. "About seven years ago, we had a whole lineup of Tiger toys scheduled to be on *Good Morning America*," he remembers ruefully. "The South Africans had to pick that day to let Nelson Mandela out of exile."

Tiger has done everything it can to make sure that Furby is *the* toy this Christmas, that it will have parents lining up outside the nearest Wal-Mart, awaiting shipments, begging for rain checks.

Sims sounds like he's already envisioning the kind of temporary shortages that can elevate a hot toy to the level of incandescence. "It's always better to sell one too few than one too many," he says. "That way, people don't feel you've oversaturated the market." Based on orders, he suspects that 1.5 million Furbies - the number Tiger hopes to produce by the end of 1998 - won't be enough to satisfy the demand.

"With Furby, we feel like the issue is almost putting the reins on its success and making sure we drive it properly," boasts Shiffman, the company's president.

That's assuming the product is ready for the shelves by October 1, the ship dates don't slip any further, and there aren't any unforeseen snags at the four factories racing to make Furbies. It's also assuming that no other toy, beating Furby to the punch, becomes the phenom of Christmas '98.

The early returns look good. When Rosenberg brought a prototype Furby home, to prepare for a presentation he was giving to General Mills, his 5-year-old son called it "the coolest thing you guys have ever made." And when Rosenberg dismantled the toy to put it into its carrying case, his 3-year-old daughter started crying.

## Happy Hacking

*By Kingpin*

Hacking a toy can be as fulfilling as infiltrating a large corporate computer system, as I've learned during my various adventures with Tamagotchi, Playskool Talking Barney, Texas Instruments's Speak & Spell, and various other playthings. Because most microcontroller-based toys use the same basic theory to direct their behavior, the following instructions can serve as a general guide for toy hacking:

### **Step 1: Remove the control circuitry from the toy.**

In most special feature plush toys, the electronic control system is located in the same small plastic box that contains the batteries. You can usually just pull the box out of the toy through a velcro slit in the fur that provides access to the battery compartment. If necessary, you can use a scalpel. Be careful not to break the wires leading from the box to any of the toy's "internals," such as the light, pressure, or sound sensors. The US\$24.99 Playskool Barney I hacked had a four-wire connector that joined Barney's "brain" to two pressure switches located inside his hand and stomach.

### **Step 2 Develop a schematic.**

Portable electronic toys are usually controlled by a 4-bit or 8-bit microprocessor, with some type of ROM/ RAM to store and execute the software. You might find that yours has one or more black blobs on the circuit board. These are known as chip-on-board (COB) packages; one will probably serve as the CPU. (If you get lucky, your toy will have standard plastic packages for the CPU and/or ROM, rather than the smaller COB. The larger the component, the easier it is to experiment with.) You can begin developing a schematic simply by drawing the components and the connections among them. By following the connections between the CPU and the switches, sensors, and other external devices, you'll quickly be able to determine the I/O (input/output) pins. Once the schematic is complete, the toy's basic functions - and how to change them - will be much clearer.

### **Step 3 Reverse-engineer the circuit.**

With your schematic as a guideline, use an oscilloscope, logic analyzer, logic probe, or multimeter to monitor the signals coming to and from various pins on the CPU. If you know where the switches are connected, you can short the pins together with a screwdriver or wire to simulate a button press. By learning the function and behavior of the pins on the CPU, you should be able to learn how the toy operates.

The Playskool Barney has two COB packages. I first assumed that one COB was the microprocessor, the other, marked "U1", a voice-storage unit. The audio was formed by a frequency-modulated square wave generated by the CPU. (Simpler designs may use a set of resistors to form a simple, low-cost digital-to-analog converter to generate the audio.) Simulating a press of the "hug" button elicited such phrases as "You're stuupendous!" "You're super-d-doooper!" and "Remember - I love you!" When I pushed Barney's right hand, however, the CPU constructed sentences out of subsets of words in a seemingly random way. Very clever!

#### **Step 4 Reprogram or redesign the circuit.**

The simplest modifications involve replacing the external switches with relays, transistors, or custom electronic designs. On Playskool Barney, for example, replacing the pressure switch in the tummy with an optical sensor will turn it into a sunrise-activated alarm-clock. If you know where the switch interfaces with the PC board, you can easily complete this hack. Getting more complex, you could swap address pins or exchange components.

I also added my own sound samples to Barney's internal circuitry. Using an ISD voice/record playback IC (RadioShack #276-1325, \$17.99), I redesigned an entirely separate circuit board and connected it to the hand and tummy switches. Now, when someone squeezes Barney, he says things I recorded from *South Park*, including "This makes me look like one bad muthafucka."

Depending on the design, you can change the pitch, speed, or volume of the generated audio by replacing fixed resistors with a potentiometer (a variable resistor). Connecting certain pins to ground (or pulling them high) can also lead to interesting "features." The popular Tamagotchi toy, for example, can be made to last longer or grow stronger by resetting various internal pins.

Don't be afraid to experiment. And don't be afraid to damage components - the joy of hardware hacking is figuring out how things work. The manufacturers just want you to buy another toy, anyway.

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